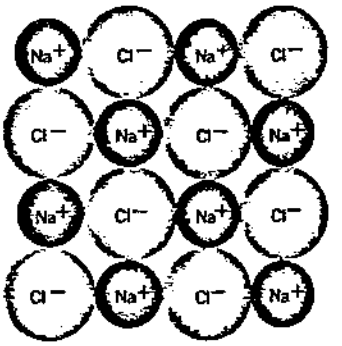
SCH4U1

IONIC SOLIDS

Ionic solids result from the reaction of a metal and a non-metal. Because of the large electronegativity difference, electron(s) transfer from the metallic atom to the non-metallic atom and the resultant ions then attract each other. Thus, as one would expect, ionic solids are held together by ionic bonds. Any ionic crystal can be considered to be an array of positive and negative ions, arranged in such a way that every positive ion has only negative neighbours and vice versa. There are no distinct molecules in an ionic solid. The attraction that the oppositely charged ions have for one another gives the ionic solid its stability.



Ionic solids are hard and have high melting points due to the strong ionic bonds holding the ions together. Ionic solids are brittle and do not conduct electricity because there are no mobile electrons in them. Every electron in an ionic solid belongs to an ion and is unable to move to any other ion. Molten ionic solids are able to conduct electricity, however, although not as well as metals. The electric charge is carried through a molten ionic compound by slow-moving positive and negative ions rather than fast-moving electrons. When ionic solids dissolve in water, they dissociate into ions and thus form solutions which conduct electricity. When comparing the properties of ionic solids, one needs to consider the strength of the ionic bonds in the solids. The strength of an ionic bond depends on two factors. First of all, since the charge of an ion acts as though it were concentrated at the center of the ion, one can see that the larger the radii of the ions, the greater is the distance between the ions and the smaller is the force of attraction. Thus, for example, NaCl has a higher melting point than CsCl because its ions are smaller and therefore can attract each other more strongly. Second of all, the force of attraction between charged ions is directly proportional to the magnitude of the charges on the ions. Thus, for example, MgO has a higher melting point than NaCl because it consists of ions with greater charges on them.

	Melting Point (°C)	Solubility (g/100g H2O @ 0°C)		Melting Point (°C)	Solubility (g/100g H2O @ 0°C)
CsCl	646	161	MgO	2800	0.0006
NaCl	800	35.7	NaCl	800	35.7